

The background is a collage of three images. The top left shows a green tractor with a blue implement working in a field. The top right shows a large, multi-story stone building, likely a research facility, with a yellow field in front. The bottom center is a white triangular area containing the text.

Open Day

Oak Park Crops Research, Carlow
Thursday, 23 June 2011

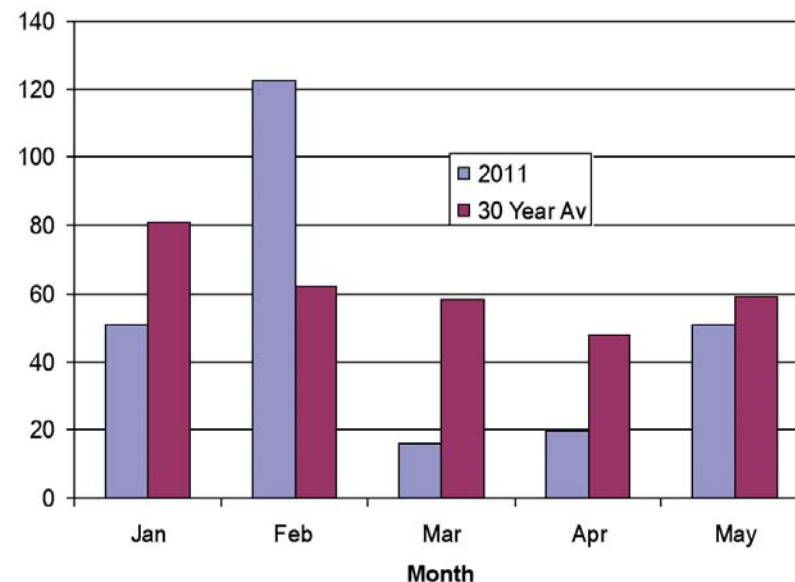
Welcome to the 2011 Teagasc Oak Park Crops Open Day

The outlook for the tillage industry has improved considerably since our last open day in 2009. Crop prices in 2010 were significantly improved over those that looked possible at the time of planting. In 2011 good prices could be realised through forward selling from the start of the season, and have improved since as production prospects elsewhere in the world have declined. This volatility in prices is a reflection of a global tightening of the supply and demand balance. As an industry there is little we can do to affect world commodity prices, except to use the wider range of marketing options now available to smooth some of the volatility. However we must ensure our competitiveness by continually improving technical efficiency. Exploiting the high yield potential which our climate provides, whilst keeping a control of costs to maximise return, is critical. This is embodied in the theme of this years open day: 'Meeting Production Targets'.

The Teagasc Crops, Environment and Land Use research programme, is focussed on improving the technical efficiency of the industry whilst meeting the challenge of protecting the production environment for future generations. While our resources are limited, our objectives in terms of yield, quality and cost control are clear. We are therefore proud to have this opportunity to demonstrate some of the on-going work of the programme, as well as work carried out elsewhere in Teagasc, that is relevant to the tillage industry.

This spring was dominated by low rainfall levels. Elsewhere in Europe lack of rain has reduced yield potential, here at Oak Park in March, April & May we have recorded only 52% of our normal rainfall. Despite this, in many areas we have had enough rain at the right times for crops to have 'reasonable to good' yield potential provided we get sufficient rain for the remainder of the season. As a result of the dry weather, the high early-season disease levels in barley have declined, but in wheat Septoria levels

are higher than one would expect, and are providing a good test of some of the new fungicides coming on to the market. Disease control will be just one of the highlights of the broad research programme including near-market and longer term projects which provide support to the future vitality of the tillage sector in Ireland.



The programme would not be possible without the support and collaboration of a broad section of the industry and the Department of Agriculture in particular, for which we are very grateful.

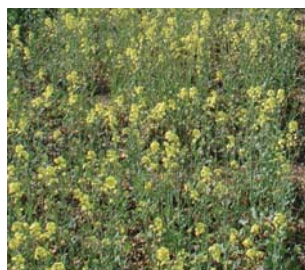
We trust that you will enjoy your day, and go away with new knowledge and ideas that you can utilise in your own businesses.

John Spink
Head of Crop Science Department
Teagasc Oak Park

Oilseed rape management

Establishment

- ✓ Roots sensitive to compaction – deep cultivations may be needed
- ✓ Drill early – Pigeons, weed competition, N scavenging
- ✓ Establish 30 plants/m² in spring



N management

- ✓ Moderately sized crops yield best
- ✓ Target canopy size 3.5 GAI at start of flowering
- ✓ Need 50 kgN/ha from soil or fertiliser to make 1 GAI
- ✓ Fertiliser ~ 60% efficient
- ✓ Need an additional 60kg fertiliser N per tonne of yield over 3.5t/ha applied late
- ✓ Average benefit 0.36 t/ha and -9% CO₂ cost



Oilseed rape management

Fungicide use

- ✓ Phoma (10-20% plants infected) and LLS (>25% plants infected) treat in autumn
- ✓ Follow up in spring if re-infection
- ✓ Sclerotinia spray at early petal fall if history in area



PGR use

- ✓ Tebuconazole and metconazole effective growth regulators
- ✓ Spring PGR needed on crops greater than 1 GAI in mid-March
- ✓ Optimum timing ~green bud



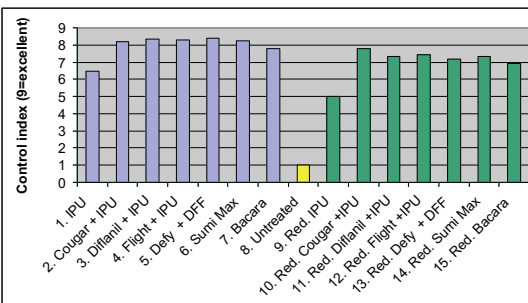
Winter wheat: Weed Control

Autumn Weed Control

- Best control pre/early post emerge
 - Control AMG before tillering
 - Clean up may be needed where
 - Wild oats, Cleavers, Groundsel
- Weed control can increase yield by up to 2.0 t/ha



Winter Wheat herbicide trial 2010



Av. Score in 3 sites, 2010.
Treat 1-7 @ commercial rate
Treat 9-15 @ 30% of commercial rate

Results 2010 -(1 year only)

- All products performed well
- Red. rates-lower control but acceptable
- Spring weeds due to frost heave
- Spring clean up not always necessary

Spring Herbicides for winter wheat

- Alister, Pacifica, Broadway Star, etc.

Advantages

- Can be useful to clean up (BLW, AMG)
- Cost effective on W Oats

Disadvantages

- Heavy reliance on ALS herbicides
- Need correct growing conditions
- Tank mix restrictions

Key Message

- Autumn application still effective
- Reducing rates will reduce persistency

Soil Fertility - 'P & K'

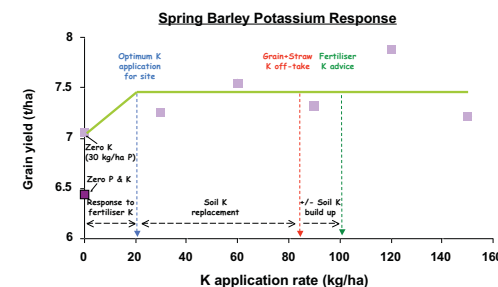
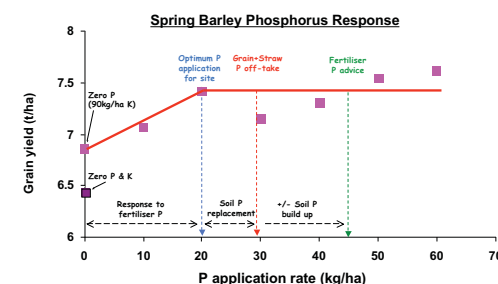
Phosphorus & Potassium

- ✓ Apply correct levels
- ✓ Soil P & K build up?
- ✓ P & K essential for
 - Root & tiller development
 - Better N efficiency

Spring Barley Trial 2010

- ❑ Low P & K index site
- ❑ Opt P response 0.55t/ha
- ❑ Opt K response 0.40t/ha
- ❑ Average response with P + K inputs 0.95 t/ha

- ❑ Results for 1 year only
- ❑ Results may vary between sites & soils



Take Home Message

- ✓ Test soils regularly & monitor soil P & K levels
- ✓ Select fertilisers to match Soil & Crop requirements

Winter Barley: Disease Control

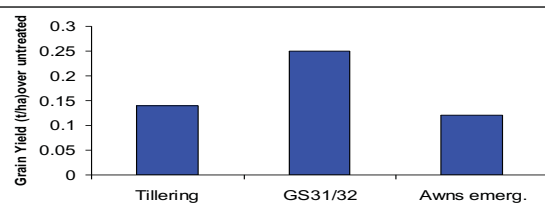
Control Measures

- Rotation
- Cultivation method
- Seed
- Variety
- Husbandry
- Fungicide use

Traditional Fungicide Programmes

- Two applications (GS 31-32 + GS 39-55)
- Are crops losing potential from early disease?

Timing trial: Cork & Oak Park 2010



Early fungicides increased yield by:

- Green canopy retention
- Increased light interception
- Increased grain numbers

Increased yields by 0.4 t/ha

Trials Programme Suggests

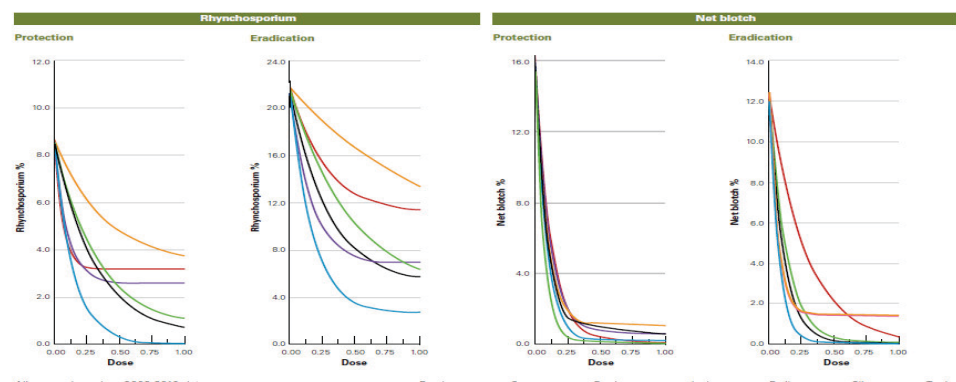
- 3 fungicide applications
 - 1 - Late Tillering
 - 2 - Early stem extension
 - 3 - Awns emerged/head emerged



Barley: Disease Control

Fungicide Ratings (HGCA 2011)

Fungicide performance curves



All curves based on 2009-2010 data

The HGCA barley disease management guide 2011

Spring Barley

- Return from fungicides
 - 40% for early application (GS30-31)
 - 60% for late application (Heading)
- High early disease pressure may change this response

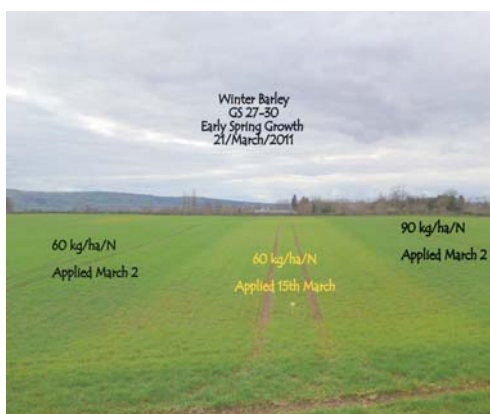


Ramularia Net Blotch

Winter Barley: Management Demos

Demonstration to show

- Different management techniques
- Nitrogen
- Fungicides
- Effect of nitrogen on tiller numbers
- Effect of disease control



N Treatment Difference)

	Ears m ²	Grains/m ² (%)
1. 60 kg/ha (early March) + 120 kg/ha (GS 31) 791	17,251	
2. 60 kg/ha (mid March) + 120 kg/ha (GS 31) 720	16,769 (-3%)	
3. 90 kg/ha (early March) + 90 kg/ha (GS30) 843	18,891 (+9.5%)	
4. 60 kg/ha (early March) + 86 kg/ha (GS 31) 819	17,606 (+2%)	
+ 34 kg/ha at heading		

Fungicide treatments

No. 1	Standard 2 fungicides (GS 31, heading)
No 2- 4	Used 3 fungicide sprays (tillering, GS 30, heading)

Septoria Resistance



Septoria can reduce yield by up to 40%

- Triazoles are the 'backbone' of wheat fungicide programmes
- Strains with reduced sensitivity Opus & Proline now widespread
- Mutation S524T associated with recent shift in sensitivity

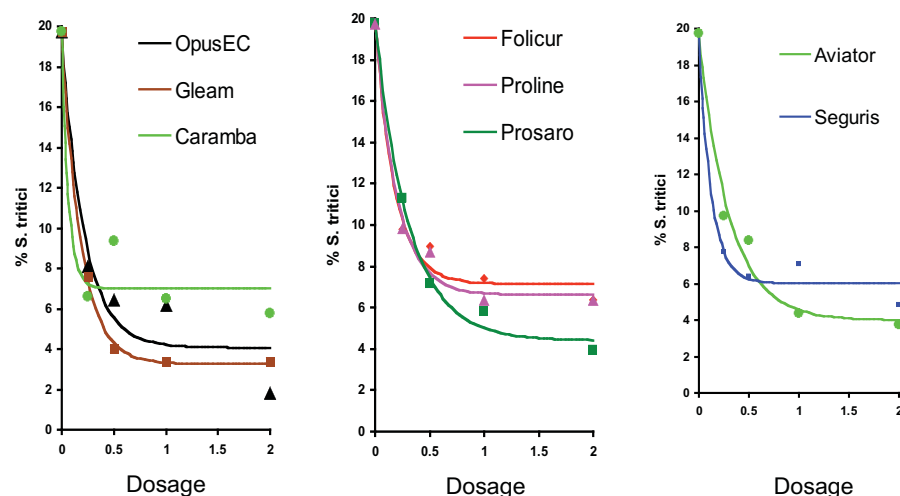
It has a history of developing resistance

<u>Fungicides</u>	<u>MOA</u>	<u>Developed</u>	<u>Resistance</u>	<u>Mutation</u>
MBCs	Single-Site	Late 1960s	1985	E198A
Triazoles	Single-Site	Mid 1970s	Mid 1990s	Complex
Strobilurins	Single-Site	Mid 1990s	2002	G143A
SDHIs	Single-Site	Late 1960s	None	
Chlorothalonil	Multi-site	Mid 1960s	None	

Septoria Control

- Variety must be first line of defence!
- New SDHI chemistries providing additional control
- Mixtures of triazoles outperforming solo products

HGCA Dose Response – Ireland 2010



Breeding for Septoria resistance

Why?



- Hugely important disease to Irish wheat farmers.
- High fungicide costs : € 14 million p.a.
- *But* reduced fungicide efficacy!

What's the Plan?

- Select lines from the field which are high yielding but have good resistance
- Identify genes for Septoria resistance in these lines.
- Use them to breed better varieties.



Next generation wheat ??

How do we do it?



- Use the latest technologies to identify genes
- Work closely with breeding companies, so the varieties reach market faster

What's the benefit to you?

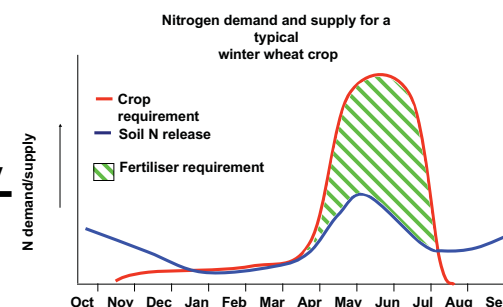
- Better varietal resistance means less fungicide.
- Reduce fungicide usage by up to half.
- Saving € 7 million p.a!
- Improve the profitability, competitiveness and sustainability of your farm.

N for winter wheat

Fertiliser N requirement =

Crop requirement – Soil N supply

% Fertiliser recovery



Soil N supply

Can it be better predicted?

Can **crop requirement** be better estimated?

In-season adjustment of fertiliser N inputs

Can **fertiliser N efficiency** be improved?

Currently 40-80% recovery

N for Spring barley

Questions:

Are N recommendations sufficient for yield?

What factors influence proteins in barley?

Plot experiments:

Effect of N amount, timing and splitting on grain yield and protein

Environmental effects of altered N inputs

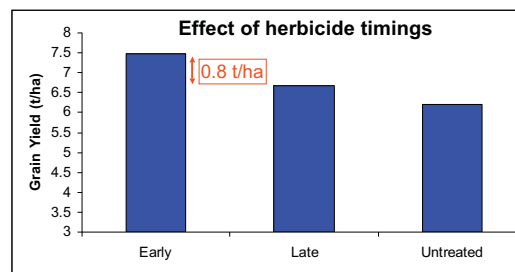
Survey of commercial crops:

- spatial variation in protein contents
- effect of:
 - Soil characteristics
 - Field history
 - Crop management
 - Seasonal factors

Spring Barley: Weed Control

Good Spring Weed Control depends on:

- Weed size
- Growing conditions
- Herbicide rate used
- Even application



Herbicide used Ally Max + Galaxy

Results (1 year)

- Spray early in weedy ground
- Reduced rates gave similar results
- Avoid high rates on stressed crops
- **Late application lost 0.8t/ha**

Key Message

- Apply products early
- Reduce rates when conditions allow

Aim to spray after
3 good growing days

S. Barley: Annual Meadow Grass Control



Annual Meadow Grass

- Competitive in large numbers
- Field history important
- Favoured by wet springs



Control Options

Pre Emergence

- Pendimethalin (Stomp, etc.)
- Defy (awaiting PCS clearance)

Advantages

- Good Activity
- Reduces early competition
- Control many BLW

Disadvantages

- Soil moisture dependent
- May need follow up treatment
- Visible tramlines?

Post Emergence

Hussar (MS)

Advantages

- Only post emerge option

Disadvantages

- AMG Mod. Susceptible
- Early application necessary
- Small target
- Often applied too late

Min-Till: Cross-Roads?

For:

- ✓ Establishment workrate
- ✓ Lower machinery costs- 30-50% less
- ✓ Suitable for scale and labour efficient
- ✓ SOC: 0.5-1.0t C/ha/yr

Carbon footprint:

360 vs 362 kg CO₂eq/t grain
(equal yields and without Soil C)



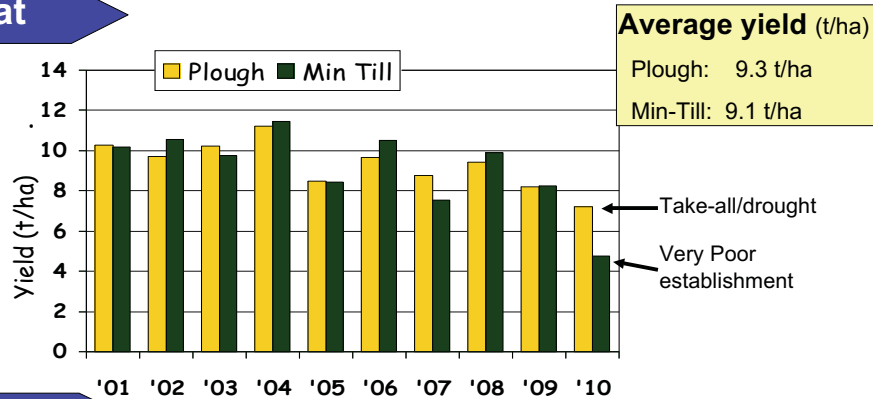
Against:

- ✗ Wet autumns
- ✗ Yield stability
- ✗ Spring crops (heavier soil)
- ✗ Grass weeds (S.Brome)
- ✗ Soil compaction
- ✗ Management requirement
- ✗ Two systems needed?

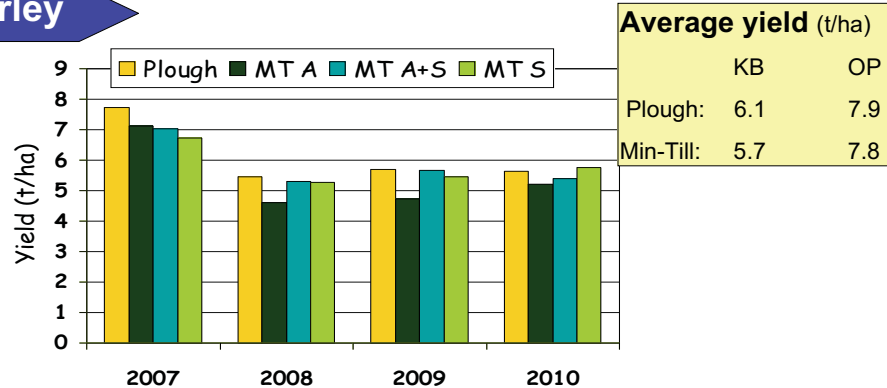


Min-Till: Crop performance

Wheat



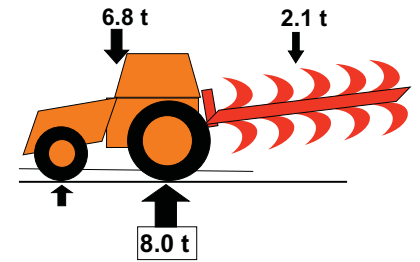
S.Barley



Soil Compaction: key threat

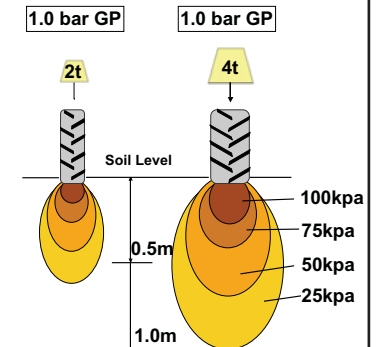
Why?

- ◆ Machine weight / axle load
- ◆ Continuous Tillage
- ◆ Reducing SOC
- ◆ Structure damage
- ◆ No Rotation breaks



Key factors:

- ◆ Soil moisture
- ◆ Axle/Wheel Loads
- ◆ Traffic Density
- ◆ Tyre size and ground pressure
- ◆ Target 0.35 to 1.5 bar depending on conditions



Crops Better Farm



National Open days
on each farm
June 2012

Growers

- Crowleys, Cork
- Williamsons, Wexford
- O'Donoghues, Meath

Farming

400ha
170ha
280ha

Farm Highlights

- Planning at heart of decision making
- Taylor inputs to maximise profits
- Among Top 10% of Growers (NFS)

Review all information



Increase
efficiency &
profits



Management
of crops

-E-Crops
-e-PM
-Cash Flow

Analysis of
current year

-Rotation
-Chemical
-Cash flow

Planning for
the year ahead

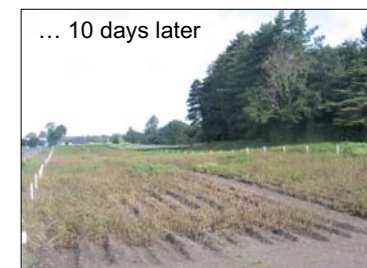
The Blight Challenge

What ??

- Blight disease remains biggest threat to Irish potato crops
- Annual losses ~ €8 million pa

Why the challenge??

- More aggressive strains of blight now in Ireland
- Fungicide resistant
- Strains are crossing and delivering types we have not seen before



What are the facts ??

- Teagasc continues to survey blight populations
- Researching new strains and their potential to cause disease and tolerate fungicides

Are GM crops relevant ?

GM crops currently available:

- Blight tolerant potato
- Herbicide tolerant maize



Why GM potato ??

- More aggressive strains of blight
- EU legislation restricts certain chemical controls

What are the facts ??

- Reduced environmental impact with GM potato
- GM potatoes can coexist with non-GM systems
- GM will deliver when part of an integrated strategy
- Blight will overcome all traits (GM or non-GM)
- But GM provides opportunity to accelerate breeding and stay one step ahead

What is the Agricultural Catchments Programme?

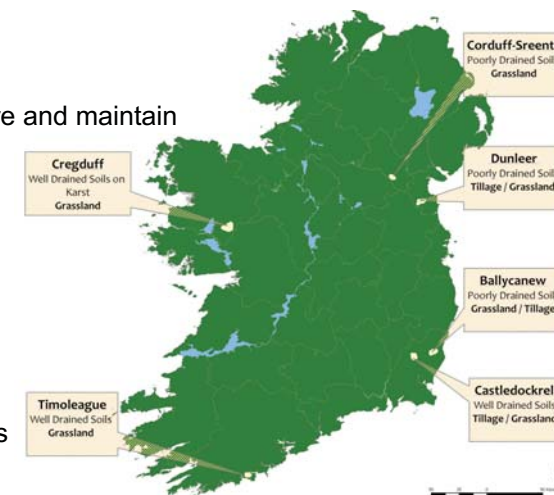
- Research/advisory programme delivered in partnership with farmers
- Focusing on maintaining and improving water quality and farm profitability/production
- Operates in small river catchments (600 to 3000 ha) with range of farm enterprises and soil types

Aims

To support profitable agriculture and maintain or improve water quality

To evaluate:

- Nitrates Directive National Action Programme
- Nutrient use on farms, nutrient status of soils and potential losses to surface and groundwater
- Farmer attitudes to the Nitrates Directive
- Economic consequences of implementing the GAP measures



Concept

Nutrient Sources



Mobilisation

Pathway

Delivery

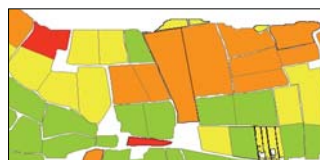
Impacts



Nutrient Use on Farms

- Nitrogen and Phosphorus limited under Nitrates Regulations
- Information needed to evaluate level of nutrients required for optimum production at farm and field scale
 - Nutrient inputs and outputs
 - Soil fertility status
- Whole farm may be in P balance but field balances can vary widely
- Nutrients lost via hydrological pathways
 - nitrate may leach to groundwater, phosphorus may be lost in run-off
- Risk of loss may be increased in
 - high P fields (index 4), periods of low green cover, fields bordering streams and ditches
- Nutrient deficiency may hit crop yield
- Win/win for farming and environment if we get nutrient management right

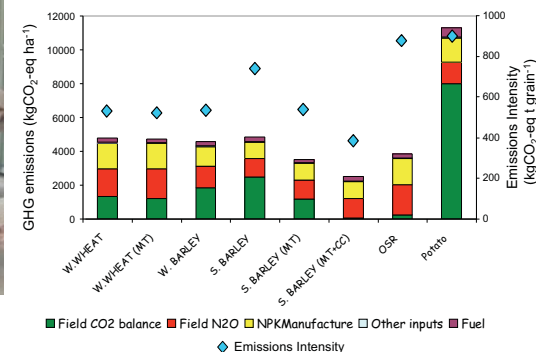
P_LIMS
P_index



GHG Emissions from Tillage

Greenhouse gas (GHG) emissions from tillage are relatively low compared to livestock and are mainly associated with....

- Soil Carbon release associated with ploughing operations & during fallow periods
- Nitrous oxide (N_2O) following fertiliser application & crop residue breakdown
- Manufacture of crop inputs & fuel usage during tillage operations



GHG Emissions from Tillage

Potential Solutions

- Increase N efficiency by targeted application of fertilisers
- Optimise herbicide/pesticide application to maximize yields
- Use of urease and N inhibitors in conjunction with urea
- Reduced soil disturbance (minimum tillage)
- Reduced fallow through promoting volunteer growth, winter crops or cover crops

